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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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KATTEN MUCHIN ROSENMAN LLP
575 MADISON AVENUE
NEW YORK, NY 10022-2585

EXAMINER	
TORRES, JUAN A	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/783,893	SEKI ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/12/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-13* is/are pending in the application.

4a) Of the above claim(s) *10 and 14* is/are withdrawn from consideration.

5)☒ Claim(s) *11-13* is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election of Group II in the reply filed on 10/12/2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 10 and 14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group I, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10/12/2006.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

The drawings are objected to because:

a) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "$65b_2$" to "$65b_N$" (figure 4).

b) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "$174b_2$" to "$174b_N$" (figure 6).

c) The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "19" (figure 16); and "22" (figure 19).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

a) The recitation in page 2 lines 7-27 "In orthogonal frequency division multiplexing, frequency spacing is arranged so as to null the correlation between a modulation band signal transmitted by an nth subcarrier of a multicarrier transmission

and a modulation band signal transmitted by an (n+1)th subcarrier. If we assume that a symbol (a complex baseband signal) transmitted by the nth subcarrier (center frequency: fn) is represented by zn (=an+jbn), then we may write modulation band signal sn(t)=Re[zn exp(j2πfn t)] (where Re represents the real part of the complex number). The requirement for the (n+1)th subcarrier to be orthogonal to the nth subcarrier is that the cross correlation between sn(t) and sn+1(t) be 0. If the frequency spacing between neighboring subcarriers is fd and the period of the symbol zn is T, then, in order for the cross correlation to become 0, it will suffice for fd=k/T (k=1, 2, . . .) to hold and the minimum spacing will be fd=1/T. A multicarrier multiplexing scheme having frequency spacing is an orthogonal frequency division multiplexing scheme" is improper (see figures 10 and 11); it is suggested to be changed to "In orthogonal frequency division multiplexing, frequency spacing is arranged so as to null the correlation between a modulation band signal transmitted by an nth subcarrier of a multicarrier transmission and a modulation band signal transmitted by an (n+1)th subcarrier. If we assume that a symbol (a complex baseband signal) transmitted by the nth subcarrier (center frequency: f_n) is represented by z_n ($=a_n+jb_n$), then we may write modulation band signal $s_n(t)=Re[z_n \exp(j2\pi f_n t)]$ (where Re represents the real part of the complex number). The requirement for the (n+1)th subcarrier to be orthogonal to the nth subcarrier is that the cross correlation between $s_n(t)$ and $s_{n+1}(t)$ be 0. If the frequency spacing between neighboring subcarriers is f_d and the period of the symbol z_n is T, then, in order for the cross correlation to become 0, it will suffice for $f_d=k/T$ (k=1, 2, . . .) to

hold and the minimum spacing will be $f_d=1/T$. A multicarrier multiplexing scheme having frequency spacing is an orthogonal frequency division multiplexing scheme".

b) The recitation in page 4 line 24 ""fN_M" seems to be improper see page 5 line 5) ; it is suggested to be changed to "f_{NM}".

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

Claim 4 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations of claim 4 "assigning a plurality of subcarriers exclusively to each user; and performing multicarrier transmission of the transmit data from each user by the subcarriers assigned "are already claimed in claim 1 "assigning a plurality of different subcarriers to each user; and performing multicarrier transmission of the transmit data of a user by the subcarriers assigned".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (EP0786890 A2) (hereafter, referred as Suzuki, this patent is also published as US 6400679 B1).

As per claim 1, Suzuki discloses assigning a plurality of different subcarriers to each user (abstract; figures 2, 3 and 5A-11; page 3 lines 31-33); and performing multicarrier transmission of the transmit data of a user by the subcarriers assigned (abstract; figures 2, 3 and 5A-11; page 3 lines 14-17).

As per claim 4, Suzuki discloses claim 1, Suzuki also discloses assigning a plurality of subcarriers exclusively to each user (abstract; figures 2, 3 and 5A-11; page 3 lines 31-33); and performing multicarrier transmission of the transmit data from each user by the subcarriers assigned (abstract; figures 2, 3 and 5A-11; page 3 lines 14-17).

As per claim 7, Suzuki discloses claim 1, Suzuki also discloses extracting, by filtering, a receive signal component of a frequency domain of subcarriers that have been assigned to the user (figure 4 page 3 lines 38-41; page 5 lines 10-12); and performing demodulation processing using the extracted receive signal component (figure 4 block 32 page 3 lines 34-37).

Claims 5-6 are rejected under 35 U.S.C. 102(a) as being anticipated by Applicant Admitted Prior Art (hereafter, referred as AAPA).

As per claim 5, AAPA discloses assigning the same subcarriers to a plurality of users and assigning different orthogonal codes to each user (figure 16, 20 and 21 page 8 lines 1-31); and transmitting the transmit data of each user by performing code multiplexing on the same subcarriers (figure 16 block 15 page 5 lines 12-34).

As per claim 6, AAPA discloses claim 5, AAPA also discloses applying identical transmit beam-forming processing to the transmit data of said plurality of users to which the same subcarriers have been assigned (figure 23 page 10 lines 1-17)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claim 1 above, and further in view of Fattouche (US.5555268 A) (hereafter, referred as Fattouche). Suzuki discloses claim 1, Suzuki also discloses transmitting each of the results of addition by the subcarrier assigned (abstract; figures 2, 3 and 5A-11; column 3 lines 9-15). Suzuki doesn't disclose assigning M-number of orthogonal codes to a user; converting transmit data to parallel data comprising M-number of symbols by a serial-to-parallel conversion; multiplying an ith symbol of the parallel data individually by each code constituting ith orthogonal codes; adding corresponding results of multiplication from among the results of multiplication obtained for every symbol. Fattouche discloses assigning M-number of orthogonal codes to a user

(abstract, figure 1; column 2 lines 2-16 and lines 34-39; and column 4 lines 4-20); converting transmit data to parallel data comprising M-number of symbols by a serial-to-parallel conversion (abstract, figure 1 block 10; column 4 lines 4-20); multiplying an ith symbol of the parallel data individually by each code constituting ith orthogonal codes (abstract, figure 1 block 12; column 4 lines 4-20); adding corresponding results of multiplication from among the results of multiplication obtained for every symbol (abstract, figure 1 block 14; column 4 lines 4-20). Suzuki and Fattouche are analogous art because they are from the same field of endeavor of CDMA systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the Multi Code CDMA disclosed by Fattouche with the Multi carrier CDMA disclosed by Suzuki. The suggestion/motivation for doing so would have been to enhance the throughput (Fattouche column 1 lines 66-67).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claim 1 above, and further in view of Tanaka (US 6347220 B1) (hereafter, referred as Tanaka) (this is also Applicant Admitted Prior Art in figures 22 and 23 page 8 line32 to page 10 line 21 of the specification). Suzuki discloses claim 1, Suzuki also discloses assigning a plurality of subcarriers exclusively to each user (abstract; figures 2, 3 and 5A-11; column 3 lines 41-47); and transmitting transmit data to each user by the subcarriers assigned (abstract; figures 2, 3 and 5A-11; column 3 lines 9-15). Suzuki doesn't disclose applying beam-forming processing user by user. Tanaka discloses applying beam-forming processing user by user (abstract, figures 10 and 11 column 1 lines 26-45). Suzuki and Tanaka are analogous art because they are from the same

field of endeavor of CDMA systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the CDMA multiple beam antenna disclosed by Tanaka with the Multi carrier CDMA disclosed by Suzuki. The suggestion/motivation for doing so would have been to reduce interference between channels, improve reception SN ratio owing to a higher antenna gain and a reduce terminal transmission power (Tanaka column 1 lines 40-46).

Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claim 1 above, and further in view of Applicant Admitted Prior Art (hereafter, referred as AAPA). Suzuki discloses claim 1. Suzuki doesn't disclose performing transmission upon dispersing subcarriers along a frequency axis by using frequency interleaving. AAPA discloses performing transmission upon dispersing subcarriers along a frequency axis by using frequency interleaving (figure 16 block 16 page 5 lines 19-23). Suzuki and AAPA are analogous art because they are from the same field of endeavor of CDMA systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the CDMA frequency interleaving disclosed by AAPA with the Multi carrier CDMA disclosed by Suzuki. The suggestion/motivation for doing so would have been to obtain frequency-diversity gain (page 5 lines 19-23)

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fattouche (US 5555268 A) in view of Suzuki (EP0786890 A2).

Fattouche discloses a serial/parallel converter for subjecting the transmit data to a serial-to-parallel conversion (abstract, figure 1 block 10; column 4 lines 4-20); a

multiplier for multiplying one symbol of parallel data, which has been obtained by the serial-to-parallel conversion, individually by each code constituting orthogonal codes that have been assigned to a user, and similarly multiplying each symbol of the parallel data individually by each code constituting other orthogonal codes that have been assigned to said user (abstract, figure 1 block 12; column 4 lines 4-20); a combiner for combining results of multiplication by corresponding codes of each of the orthogonal codes (abstract, figure 1 block 14; column 4 lines 4-20). Fattouche doesn't disclose a transmitting unit for performing multicarrier transmission of each of the combined results by a plurality of subcarriers that have been assigned to the user. Suzuki discloses a transmitting unit for performing multicarrier transmission of each of the combined results by a plurality of subcarriers that have been assigned to the user (abstract; figures 2, 3 and 5A-11; page 3 lines 14-33). Fattouche and Suzuki are analogous art because they are from the same field of endeavor of CDMA systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the Multi Code CDMA disclosed by Fattouche the Multi carrier CDMA disclosed by Suzuki. The suggestion/motivation for doing so would have been to prevent deterioration of the S/N ration (Suzuki page 2 lines 40-43).

Allowable Subject Matter

Claims 11-13 allowed.

The following is a statement of reasons for the indication of allowable subject matter: Claims 11-13 are allowed because the references cited fail to teach, as applicant has,a transmitting apparatus of a base station in a multicarrier CDMA

transmission system for multiplying user data individually by each code constituting orthogonal codes and transmitting each result of multiplication by a prescribed subcarrier, comprising an array antenna comprising a plurality of antenna elements, a beaming forming unit for applying beam-forming processing to transmit data of a user and generating transmit data for each antenna element, a multiplier, which is provided for every antenna element, for multiplying one symbol of transmit data, to which the beam-forming processing has been applied, individually by each code constituting orthogonal codes that have been assigned to a user, and a transmitting unit, which is provided for every antenna element, for performing multicarrier transmission of results of multiplication by a plurality of subcarriers that have been assigned on a per-user basis; and a transmitting apparatus of a base station in a multicarrier CDMA transmission system for multiplying user data individually by each code constituting orthogonal codes, outputting results of multiplication and transmitting each result of multiplication by a prescribed subcarrier, comprising an array antenna comprising a plurality of antenna elements, a beaming forming unit for applying beam-forming processing to transmit data of a user and generating transmit data for each antenna element, a serial/parallel converter, which is provided for every antenna element, for converting transmit data, to which the beam-forming processing has been applied, to parallel data; a multiplier, which is provided for every antenna element, for multiplying one symbol of parallel data, which has been obtained by the serial-to-parallel conversion, separately by each code constituting orthogonal codes that have been assigned to a user and similarly multiplying each symbol of the parallel data individually

by each code constituting other orthogonal codes that have been assigned to said user, a combiner, which is provided for every antenna element, for combining results of multiplication by corresponding codes of each of the orthogonal codes, and a transmitting unit, which is provided for every antenna element, for performing multicarrier transmission of each of the combined results by a plurality of subcarriers that have been assigned on a per-user basis, as the applicant has claimed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ishikawa (US 6104746 A) discloses a composite channel which is either a single high rate data or multiplexes a plurality of communication data; the composite channel is converted into parallel form so that a plurality of element channels are provided through serial-parallel conversion. WiLAN, (Spread Spectrum Wireless Technology, September 2000) discloses a multi-code DSSS CDMA.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
11-02-2006

TEMESGHEN GHEBRETINSAE
PRIMARY EXAMINER
11/3/06